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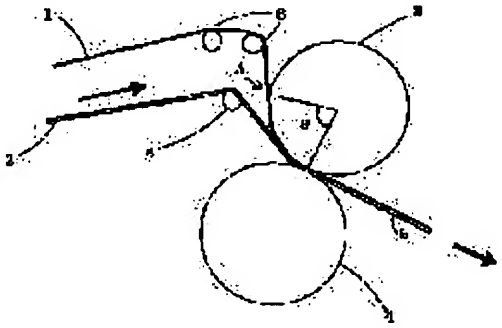
(54) METHOD FOR MANUFACTURING ONE SIDE METAL CLAD LAMINATE

(57)Abstract:

PROBLEM TO BE SOLVED: To upgrade an appearance, dimensional stability and an adhesive force by disposing a film along a rubber roll before introducing the film between rolls, then matching a metal sheet to the film and temporarily adhering the sheet to the film.

SOLUTION: The method for manufacturing one side metal clad laminate comprises the steps of disposing a thermoplastic liquid crystal polymer film 1 along a rubber roll 3, then matching a metal sheet 2 to the film 2, temporarily adhering the sheet 2 to the film 2, then introducing the both between a metal roll 4 and the roll 4, and press-adhering the body to the one side metal clad laminate 5. The metal roll preferably has a surface temperature lower by 50°C than a melting point of the film 1 to a temperature lower by 5°C than the point. The film 1 and the sheet 2 are set to states in which the both are preheated by being brought into contact with the roll 3 before heating and press bonding between the roll 4 and the roll 3 and settled in its thermal expansion. Diameters of the metal roll and the rubber roll are preferably in a range of 35 to 45 cm, and a linear speed of an outer periphery of each of the rolls is preferably 30 m/min or less.



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* NOTICES *

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2.**** shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the one side metal tension laminate obtained by the approach and this approach of manufacturing continuously the one side metal tension laminate which used the film (this may be hereafter called for short a thermoplastic liquid crystal polymer film) which consists of a thermoplastic polymer (this may be hereafter called a thermoplastic liquid crystal polymer for short) which can form the melting phase of optical anisotropy. The one side metal tension laminate obtained by this invention has the outstanding dimensional stability originating in the thermoplastic liquid crystal polymer film used as the electric insulation material, low hygroscopicity, thermal resistance, chemical resistance, and an electrical property, and is useful as a flexible patchboard or a circuit board ingredient for semi-conductor mounting.
[0002]
[Description of the Prior Art] When manufacturing conventionally the metal tension laminate used for a printed wired board etc. using a thermoplastic liquid crystal polymer film, vacuum heat press equipment is used, the thermoplastic liquid crystal polymer film and metallic foil which were judged by predetermined magnitude between the heat flatbed of two sheets are placed in piles, and heating sticking by pressure is carried out by the vacua (batch type vacuum heat press laminated layers method). However, since a vacuum heat press laminated layers method is single wafer processing, the time amount which places an ingredient in piles, 1 time of press time, the ingredient ejection time amount after a press, etc. become long, the production rate per metal tension laminate becomes slow, and cost is attached highly. in order [moreover,] to raise a production rate -- coincidence -- many -- if a facility is improved so that several sheets can be manufactured, a facility is enlarged, and an installation cost becomes high and is not desirable. Therefore, this problem is solved and development of the continuous manufacture approach that a metal tension laminate can be offered by low cost is called for.
[0003] Then, the method of manufacturing a metal tension laminate continuously has been proposed. Where (1) thermoplasticity liquid crystal polymer film and a metallic foil are piled up, for example, first Making it run the approach (to refer to JP,5-42603,A) and the (2) 2 sheet metal plate which are contacted on the heated roll and are subsequently pressurized with the roll made of rubber, or a rubber covering roll After making the roll for metal plate heating contact, heating and carrying out temporary adhesion of the film-like resin at the heated this metal plate, The approach (refer to the patent No. 2561958 official report) of introducing between the rolls for heating adhesion, and making pass and carrying out heating adhesion etc. is learned heating the metal plate of two sheets with a non-contact heating means, and setting it.
[0004]
[Problem(s) to be Solved by the Invention] However, when the temporary layered product of a thermoplastic liquid crystal polymer film and a metallic foil contacts the roll heated first by the approach of the above (1), distortion arises by the thermal expansion of a rapid metallic foil, a wrinkle occurs, and after the appearance has got worse, when it is pressurized with a rubber covered roll, there is a fault that

the wrinkle will remain in a layered product. Moreover, the approach of the above (2) is an approach of manufacturing a double-sided metal tension laminate continuously, by this approach, it is contacted on the roll which had the metal plate heated, heats a metal plate by heat conduction from a roll, and is heating film-like resin by heat conduction from a metal plate.

[0005] A deer is carried out, the purpose of this invention has a good appearance and it is to offer how it has sufficient adhesive strength and dimensional stability can manufacture a good one side metal tension laminate by low cost continuously. Moreover, other purposes of this invention are to offer the good one side metal tension laminate of quality.

[0006]

[Means for Solving the Problem] this invention persons make it run a thermoplastic liquid crystal polymer film and a metal sheet, as a result of inquiring wholeheartedly, in order to attain the above-mentioned purpose. It introduces between the rubber covered rolls in contact with the metal roll heated with doubling, and it. Make it pass, carry out heating sticking by pressure, and it faces manufacturing the one side metal tension laminate with which it comes to join a metal sheet to one side of a layered product and this film to make. A header and this invention were completed for an one side metal tension laminate with good appearance and dimensional stability being obtained continuously by making a film meet a rubber covered roll first, and subsequently carrying out temporary junction of the metal sheet before said installation between rolls, according to this film.

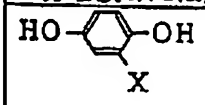
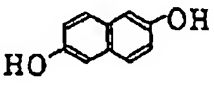
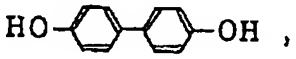
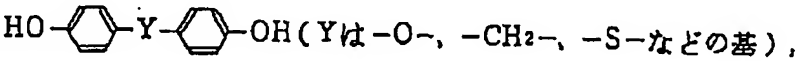
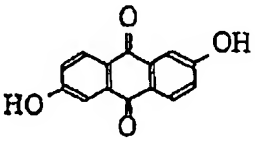
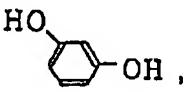
[0007] Namely, this invention makes it run a thermoplastic liquid crystal polymer film and a metal sheet. It introduces between the rubber covered rolls in contact with the metal roll heated with doubling, and it. It is the manufacture approach of an one side metal tension laminate of making it passing, carrying out heating sticking by pressure, and coming to join a metal sheet to one side of a layered product and this film to make. It is the manufacture approach of the one side metal tension laminate characterized by making a film meet a rubber covered roll and subsequently carrying out temporary junction of the metal sheet before said installation between rolls according to this film. Moreover, this invention is an one side metal tension laminate which it comes to join a metal sheet to one side of the film which consists of a thermoplastic polymer which can form the melting phase of optical anisotropy, and is obtained by the above-mentioned manufacture approach.

[0008] Although especially the raw material of the thermoplastic liquid crystal polymer film used for this invention is not limited, it can mention the well-known thermotropic liquid crystal polyester led from the compound classified into (4) from (1) illustrated below as the example, and its derivative, and thermotropic liquid crystal polyester amide. However, in order to obtain the polymer which can form the melting phase of an anisotropy optically, it cannot be overemphasized that there is suitable range in the combination of each raw material compound.

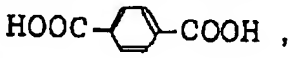
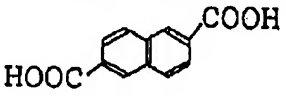
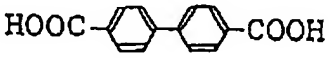
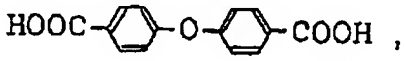
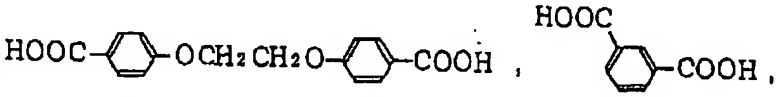
[0009] (1) Aromatic series or an aliphatic series dihydroxy compound (the example of representation is referring to Table 1)

[0010]

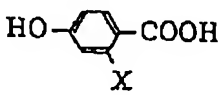
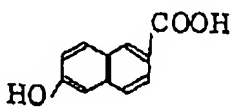
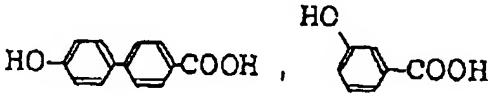
[Table 1]

芳香族または脂肪族ジヒドロキシ化合物の代表例の化学構造式
 （Xは水素原子またはハロゲン原子、低級アルキル基、フエニル基などの基）
 ,  ,
 （Yは−O−、−CH_2−、−S−などの基）,
 ,  ,
$HO(CH_2)_nOH$ （nは2～12の整数）

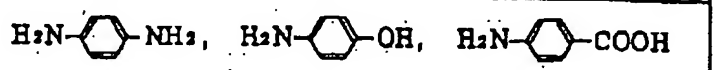
[0011] (2) Aromatic series or aliphatic series dicarboxylic acid (the example of representation is referring to Table 2)
[0012]
[Table 2]

芳香族または脂肪族ジカルボン酸の代表例の化学構造式
 ,  ,
 ,  ,
 ,
$HOOC(CH_2)_nCOOH$ （nは2～12の整数）

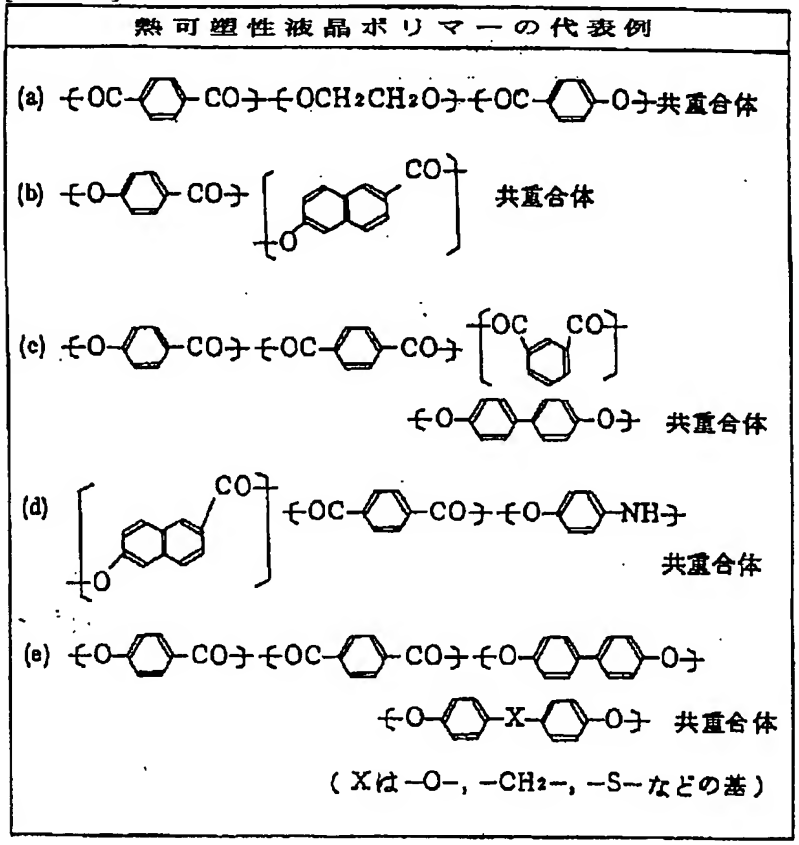
[0013] Aromatic series hydroxycarboxylic acid (the example of representation is referring to Table 3)
[0014]
[Table 3]

芳香族ヒドロキシカルボン酸の代表例の化学構造式
 （Xは水素原子またはハロゲン原子、低級アルキル基、フエニル基などの基）,
 ,  ,

[0015] (4) Aromatic series diamine, an aromatic series hydroxy amine, or an aromatic series amino carboxylic acid (the example of representation is referring to Table 4)
[0016]
[Table 4]

芳香族ジアミン，芳香族ヒドロキシアミン または芳香族アミノカルボン酸の代表例の化学構造式


[0017] Copolymer (a) - (e) which has the structural unit shown in Table 5 as an example of representation of the thermoplastic liquid crystal polymer obtained from these raw material compounds can be mentioned.
[0018]
[Table 5]

熱可塑性液晶ポリマーの代表例


[0019] moreover, the purpose which acquires the thermal resistance of a request of a film, and workability as a thermoplastic liquid crystal polymer -- setting -- about 200- within the limits of about 400 degrees C -- especially -- about 250- although what has the melting point within the limits of about 350 degrees C is desirable, from a viewpoint of film manufacture, what has the comparatively low melting point is desirable.
[0020] The thermoplastic liquid crystal polymer film used for this invention carries out extrusion molding of the thermoplastic liquid crystal polymer, and is obtained. Although the extrusion method of arbitration is applicable, a well-known T-die method, the lamination object extending method, a tubular film process, etc. are industrially advantageous. Especially, by the tubular film process or the lamination

object extending method, since stress is applied not only in the machine shaft orientations (it abbreviates to the direction of MD hereafter) of a film but in the direction (it abbreviates to the direction of TD hereafter) which intersects perpendicularly with this and the film which was able to balance the mechanical characteristics in the direction of MD and the direction of TD and a thermal property is obtained, it is used more suitably.

[0021] It is chosen from a metal which is used for electrical installation as the quality of the material of the metal sheet used for this invention, for example, gold, silver, copper, nickel, aluminum, etc. are mentioned. Copper is desirable also especially in these. Although anything that is manufactured by the rolling-out method or the electrolytic process can be used as copper, the large thing of the surface roughness manufactured by the electrolytic process is desirable. Chemistry surface treatment, such as acid cleaning usually given to copper foil, etc. may be performed to the metal sheet within limits by which the effectiveness that this invention does so is not spoiled. As thickness of a metal sheet, the range of 7-100 micrometers is desirable, and within the limits which is 9-75 micrometers is more desirable.

[0022]

[Embodiment of the Invention] Next, the manufacture approach of the one side metal tension laminate of this invention is explained based on a drawing. Drawing 1 is drawing having shown typically the manufacture approach of the one side metal tension laminate of this invention, after making the thermoplastic liquid crystal polymer film 1 meet a rubber covered roll 3 and carrying out temporary junction of the metal sheet 2 according to this film 1 subsequently, introduces and sticks both by pressure between the metal roll 4 and a rubber covered roll 3, and shows the process used as the one side metal tension laminate 5.

[0023] As for the above-mentioned metal roll, it is desirable to have the skin temperature of within the limits from temperature lower 50 degrees C than the melting point of the thermoplastic liquid crystal polymer film 1 to temperature lower 5 degrees C than this melting point. Since the rubber covered roll 3 is in contact with the metal roll and is heated by heat conduction from a metal roll, it has skin temperature lower than the skin temperature of a metal roll. In this invention, before heating sticking by pressure between the metal roll 4 and a rubber covered roll 3, the preheating of the thermoplastic liquid crystal polymer film 1 and the metal sheet 2 was carried out by contact to a rubber covered roll 3, and the dimensional change by thermal expansion needs to be settled. Hereafter, this process is beforehand referred to as being a heat process.

[0024] When sticking-by-pressure temperature is low temperature exceeding 50 degrees C from the melting point of the thermoplastic liquid crystal polymer film 1, even if the thermoplastic liquid crystal polymer film 1 and the metal sheet 2 do not paste up at all or paste up, both layered product becomes what is easy to exfoliate, and they do not bear it at practical use. Moreover, exceeding temperature with sticking-by-pressure temperature lower 5 degrees C than the melting point of the thermoplastic liquid crystal polymer film 1, in being high, the flash from the flow metallurgy group sheet 2 of the thermoplastic liquid crystal polymer which constitutes this film 1 at the time of sticking by pressure arises. Moreover, when there is nothing like a heat process beforehand and the preheating of the thermoplastic liquid crystal polymer film 1 and the metal sheet 2 is not carried out, the moment the metal sheet 2 contacted the heated metal roll 4, distortion by rapid thermal expansion arises on the metal sheet 2, and the appearance of the one side metal tension laminate 5 gets worse. Although distortion and the distortion of the shape of a stripe are canceled when distortion of the shape of a stripe arises in making the tension of a hoisting output section increase, and decreasing tension in order to prevent distortion by rapid thermal expansion, a meandering phenomenon occurs and it becomes impossible to manufacture a long one side metal tension laminate.

[0025] Even if the heated metal roll 4 does not receive a rapid thermal expansion, and distortion does not arise at the time of the pressurization between the metal roll 4 and a rubber covered roll 3 and the thermoplastic liquid crystal polymer film 1 and the metal sheet 2 in which the dimensional change by thermal expansion is beforehand settled like the heat process make the tension of a hoisting output section increase, they do not produce change in an appearance. When using the copper foil with 18

micrometers [in thickness], and a width of face of 400mm which needed to set up in consideration of the melting point of the thermoplastic liquid crystal polymer film 1, the quality of the material of the metal sheet 2, and both coefficient of thermal expansion and thickness, for example, was manufactured by the electrolytic process, the temperature of preheat temperature of about 150-250 degrees C is desirable. beforehand -- a heat process -- in the case of the quality of the material which is easy to oxidize by the oxygen in air, the ambient atmosphere of a like has [that what is necessary is just to choose according to the quality of the material of the metal sheet 2 to be used] the desirable inert atmosphere of nitrogen etc.

[0026] The diameter of the metal roll used in this invention and a rubber covered roll has the desirable range of 35-45cm respectively, and, as for both diameter, it is more desirable that it is almost the same. The include angle theta to which it sets like a heat process beforehand, and the thermoplastic liquid crystal polymer film 1 contacts a rubber covered roll 3 has the desirable range of 90-120 degrees on the basis of the contact of a rubber covered roll 3 and the metal roll 4, and its range which is 90-100 degrees is more desirable. Moreover, as for the contact die-length L, it is desirable that it is the range of 27-47cm, and its range which is 27-39cm is more desirable. Although the include angle to which the metal sheet 2 contacts a rubber covered roll 3 through the thermoplastic liquid crystal polymer film 1 becomes smaller than above-mentioned theta, the range of 70-100 degrees is desirable, and the range which is 70-90 degrees is more desirable. Moreover, although the contact die length becomes shorter than the above-mentioned L, the range of 21-39cm is desirable, and the range which is 21-35cm is more desirable. It is appropriate for the temperature of the thermoplastic liquid crystal polymer film 1 in which the preheating was carried out by this contact, and the metal sheet 2 to become the range of 100-250 degrees C, and it is more desirable to become the range which is 100-200 degrees C.

[0027] A dimension increases by its thermal expansion on a rubber covered roll 3, thermal expansion is fully eased, the tension to a travelling direction stops transmitting by friction with a rubber covered roll 3, and the thermoplastic liquid crystal polymer film 1 will be in an atony condition. In this invention, by the time it results in heating sticking by pressure between the metal roll 4 and a rubber covered roll 3 by adjusting whenever [contact angle / of the diameter of a rubber covered roll 3, and the rubber covered roll 3 of the rotational speed and the thermoplastic liquid crystal polymer film 1 / theta] etc., the thermoplastic liquid crystal polymer film 1 will be made into an atony condition. When the tension of the thermoplastic liquid crystal polymer film 1 changes into an atony condition, the effect of the dimensional change of the metal sheet 2 stops getting across to this film 1. Similarly, by the time it results in heating sticking by pressure between the metal roll 4 and a rubber covered roll 3, the metal sheet 2 will be made into an atony condition.

[0028] Moreover, the pressure applied to the thermoplastic liquid crystal polymer film 1 and the metal sheet 2 between the metal roll 4 and a rubber covered roll 3 is desirable when it is the combination of rolls which deformation does not produce substantially by the pressurization part, and making adhesive strength with sufficient by linear pressure conversion their being 5 or more kg/cm discover. Since this coating layer deforms at the time of pressurization according to the rubber quality of the material of a coating layer, the force applied to a metal roll when a metal roll has a rubber coating layer on a front face, as for the pressure applied to a thermoplastic liquid crystal polymer film and a metal sheet with a metal roll, it is desirable that they are two or more 20 kg/cm in planar pressure conversion. In this case, generating of spots can be controlled and sufficient adhesive strength can be made to discover to it. Although especially the upper limit of a pressure is not limited, in order to make the adhesive strength of a layered product fully discover in the condition that there is no flash from the flow metallurgy group sheet at the time of the pressurization of a thermoplastic liquid crystal polymer film, it is desirable not to exceed 400 kg/cm by linear pressure conversion, or not to exceed 2 [200kg / /] cm by above-mentioned planar pressure conversion. When the skin temperature of a metal roll is in a low temperature field, even if it exceeds the above-mentioned pressure, it cannot be overemphasized that the flash of the flow metallurgy group sheet of a thermoplastic liquid crystal polymer film is lost. In addition, the linear pressure of a metal roll is the value which **(ed) the force (sticking-by-pressure load) given to the metal roll with the effective width of a metal roll. Moreover, the above-mentioned planar pressure is the value

which **(ed) the sticking-by-pressure load in the area of the pressurization side formed of deformation of a metal roll at the time of sticking by pressure.
[0029] In order to obtain the one side metal tension laminate which an appearance is good and is excellent in adhesive strength and dimensional stability by this invention In case between both rolls is passed and the thermoplastic liquid crystal polymer film 1 and the metal sheet 2 are stuck by pressure at the temperature of within the limits from temperature lower 50 degrees C than the melting point of this film to temperature lower 5 degrees C than this melting point It is desirable to convert the rotational speed of the metal roll 4 into the linear velocity of the periphery, and to consider as the following by 30m/, and in order to make easy beforehand heat transfer to the metal sheet 2 like a heat process, 20m thing considered as the following by /is more desirable. Although it is not limited, since it will cause decline in productive efficiency if especially the minimum of the rotational speed of a metal roll has a too low rotational speed, it is desirable not to make it industrially lower than a part for 0.1m/.
[0030] Hereafter, although an example etc. explains this invention concretely, thereby, this invention is not restricted at all. In addition, in the following examples and examples of a comparison, measurement or evaluation of the melting point of a thermoplastic liquid crystal polymer film, the bond strength of an one side metal tension laminate, dimensional stability, and an appearance was performed as follows.
[0031] (1) The heat behavior of a film was observed and obtained using the melting point differential scanning calorimeter. That is, the location of the endoergic peak which appears when melt is quenched to 50 degrees C the rate for 50-degree-C/and carries out a temperature up the rate for 20-degree-C/again, after it carried out the temperature up of the sample offering film the rate for 20-degree-C/and it carried out melting completely was recorded as the melting point of a film.
[0032] (2) The piece of a friction test of 1.0cm width of face was created from the bond strength one side metal tension laminate, the film layer was monotonously fixed by the double faced adhesive tape, and 180 degrees of reinforcement when exfoliating a metal sheet the rate for 50mm/were measured by law according to JIS C 5016.
[0033] (3) Dimensional-stability dimensional stability was measured according to IPC-TM-650 2.2.4.
[0034] (4) That by which **, one or more wrinklings per die length of 1m, a stripe, deformation, and an unarrived part were observed in the thing which observes an appearance one side metal tension laminate by viewing, and by which O, less than one wrinkling per die length of 1m, a stripe, and deformation were observed in that by which a wrinkling, a stripe, and deformation are not observed in die length of 200m or more was evaluated as x.
[0035] With the copolymerization object of example of reference 1 para hydroxybenzoic acid, and a 6-hydroxy-2-naphthoic acid, the melting point carried out inflation film production of the thermoplastic liquid crystal polymer which is 280 degrees C at 20kg [/o'clock] discharge quantity on conditions 2.09 times the vertical draw magnification [melting extrusion, 4.77 times as many horizontal draw magnification as this and] of this. 50 micrometers of average thickness and the small thermoplastic liquid crystal polymer film of thickness distribution of **7% of thickness distribution were obtained.
[0036] As the thermoplastic liquid crystal polymer film obtained in the example 1 of example 1 reference and the electrolytic copper foil (7 micrometers of surface roughness) of 18-micrometer thickness are shown in drawing 1 , copper foil 2 has been arranged for the thermoplastic liquid crystal polymer film 1 to the rubber-covered-roll 3 side in the opposite side. The diameter used the metal roll 4 and rubber covered roll 3 which are 40cm, respectively. Guide idlers 6 and 6 were adjusted, respectively so that the thermoplastic liquid crystal polymer film 1 which a rubber covered roll 3 is made to meet might serve as contact (whenever [contact angle] 90 degrees) to a rubber covered roll 3 for 1 / 4 minutes, and so that copper foil 2 might serve as contact (whenever [contact angle] 45 degrees) to a rubber covered roll 3 for 1 / 8 minutes. The skin temperature of the metal roll 4 was set up so that it might become 260 degrees C. The skin temperature of the rubber covered roll 3 in contact with the metal roll 4 was 200 degrees C. 200 degrees C and the copper foil skin temperature of the film skin temperature measured in the location A of a rubber covered roll 3 using the radiation thermometer were also 200 degrees C. The pressures applied to a thermoplastic liquid crystal polymer film and copper foil between rolls were 120 kg/cm2 in planar pressure conversion, and the linear velocity of the periphery of

a metal roll was a part for 3m/. After making the thermoplastic liquid crystal polymer film 1 meet under the above-mentioned condition at a rubber covered roll 3 and carrying out temporary junction of the copper foil 2 according to this film 1 subsequently, both were introduced and stuck by pressure between the metal roll 4 and the rubber covered roll 3, and the one side metal tension laminate 5 was obtained. The bond strength of the obtained one side metal tension laminate was 0.8 or more kg/cm, and was enough. Other evaluation results are shown in Table 6.

[0037] As the thermoplastic liquid crystal polymer film and the rolling copper foil (0.2 micrometers of surface roughness) of 10-micrometer thickness which were obtained in the example 1 of example 2 reference are shown in drawing 1 R> 1, copper foil 2 has been arranged for the thermoplastic liquid crystal polymer film 1 to the rubber-covered-roll 3 side in the opposite side. The diameter used the metal roll 4 and rubber covered roll 3 which are 40cm, respectively. Guide idlers 6 and 6 were adjusted, respectively so that the thermoplastic liquid crystal polymer film 1 which a rubber covered roll 3 is made to meet might serve as contact (whenever [contact angle] 90 degrees) to a rubber covered roll 3 for 1 / 4 minutes, and so that copper foil 2 might serve as contact (whenever [contact angle] 45 degrees) to a rubber covered roll 3 for 1 / 8 minutes. The skin temperature of the metal roll 4 was set up so that it might become 260 degrees C. The skin temperature of the rubber covered roll 3 in contact with the metal roll 4 was 200 degrees C. 200 degrees C and the copper foil skin temperature of the film skin temperature measured in the location A of a rubber covered roll 3 using the radiation thermometer were also 200 degrees C. The pressures applied to a thermoplastic liquid crystal polymer film and copper foil between rolls were 120 kg/cm2 in planar pressure conversion, and the linear velocity of the periphery of a metal roll was a part for 3m/. After making the thermoplastic liquid crystal polymer film 1 meet under the above-mentioned condition at a rubber covered roll 3 and carrying out temporary junction of the copper foil 2 according to this film 1 subsequently, both were introduced and stuck by pressure between the metal roll 4 and the rubber covered roll 3, and the one side metal tension laminate 5 was obtained. The bond strength of the obtained one side metal tension laminate was 0.8 or more kg/cm, and was enough. Other evaluation results are shown in Table 6.

[0038] As the thermoplastic liquid crystal polymer film obtained in the example 1 of example 3 reference and the electrolytic copper foil (5 micrometers of surface roughness) of 12-micrometer thickness are shown in drawing 1 , copper foil 2 has been arranged for the thermoplastic liquid crystal polymer film 1 to the rubber-covered-roll 3 side in the opposite side. The diameter used the metal roll 4 and rubber covered roll 3 which are 40cm, respectively. Guide idlers 6 and 6 were adjusted, respectively so that the thermoplastic liquid crystal polymer film 1 which a rubber covered roll 3 is made to meet might serve as contact (whenever [contact angle] 90 degrees) to a rubber covered roll 3 for 1 / 4 minutes, and so that copper foil 2 might serve as contact (whenever [contact angle] 45 degrees) to a rubber covered roll 3 for 1 / 8 minutes. The skin temperature of the metal roll 4 was set up so that it might become 275 degrees C. The skin temperature of the rubber covered roll 3 in contact with the metal roll 4 was 200 degrees C. 200 degrees C and the copper foil skin temperature of the film skin temperature measured in the location A of a rubber covered roll 3 using the radiation thermometer were also 200 degrees C. The pressures applied to a thermoplastic liquid crystal polymer film and copper foil between rolls were 120 kg/cm2 in planar pressure conversion, and the linear velocity of the periphery of a metal roll was a part for 5m/. After making the thermoplastic liquid crystal polymer film 1 meet under the above-mentioned condition at a rubber covered roll 3 and carrying out temporary junction of the copper foil 2 according to this film 1 subsequently, both were introduced and stuck by pressure between the metal roll 4 and the rubber covered roll 3, and the one side metal tension laminate 5 was obtained. The bond strength of the obtained one side metal tension laminate was 0.8 or more kg/cm, and was enough. Other evaluation results are shown in Table 6.

[0039] As the thermoplastic liquid crystal polymer film obtained in the example 1 of example 4 reference and the aluminum foil (0.5 micrometers of surface roughness) of 50-micrometer thickness are shown in drawing 1 R> 1, aluminum foil 2 has been arranged for the thermoplastic liquid crystal polymer film 1 to the rubber-covered-roll 3 side in the opposite side. The diameter used the metal roll 4 and rubber covered roll 3 which are 40cm, respectively. Guide idlers 6 and 6 were adjusted, respectively

so that the thermoplastic liquid crystal polymer film 1 which a rubber covered roll 3 is made to meet might serve as contact (whenever [contact angle] 90 degrees) to a rubber covered roll 3 for 1 / 4 minutes, and so that aluminum foil 2 might serve as contact (whenever [contact angle] 45 degrees) to a rubber covered roll 3 for 1 / 8 minutes. The skin temperature of the metal roll 4 was set up so that it might become 275 degrees C. The skin temperature of the rubber covered roll 3 in contact with the metal roll 4 was 200 degrees C. 200 degrees C and the aluminum foil skin temperature of the film skin temperature measured in the location A of a rubber covered roll 3 using the radiation thermometer were also 200 degrees C. The pressures applied to a thermoplastic liquid crystal polymer film and aluminum foil between rolls were 120 kg/cm2 in planar pressure conversion, and the linear velocity of the periphery of a metal roll was a part for 5m/. After making the thermoplastic liquid crystal polymer film 1 meet under the above-mentioned condition at a rubber covered roll 3 and carrying out temporary junction of the aluminum foil 2 according to this film 1 subsequently, both were introduced and stuck by pressure between the metal roll 4 and the rubber covered roll 3, and the one side metal tension laminate 5 was obtained. The bond strength of the obtained one side metal tension laminate was 0.8 or more kg/cm, and was enough. Other evaluation results are shown in Table 6.

[0040] This invention about an one side metal tension laminate is drawing having shown typically other different manufacture approaches (a heat process is nothing more nearly beforehand), and after example of comparison 1 drawing 2 carries out temporary junction of the thermoplastic liquid crystal polymer film 1 according to the metal sheet 2, it introduces and sticks both by pressure between the metal roll 4 and a rubber covered roll 3, and shows the process used as the one side metal tension laminate 5.

[0041] As the thermoplastic liquid crystal polymer film obtained in the example 1 of reference and the electrolytic copper foil (7 micrometers of surface roughness) of 18-micrometer thickness are shown in drawing 2 , copper foil 2 has been arranged for the thermoplastic liquid crystal polymer film 1 to the rubber-covered-roll 3 side in the opposite side. The diameter used the metal roll 4 and rubber covered roll 3 which are 40cm, respectively. Temporary junction of both was carried out so that the thermoplastic liquid crystal polymer film 1 might not contact a rubber covered roll 3 (whenever [contact angle] 0 degree), and copper foil 2 might not contact the metal roll 4 (whenever [contact angle] 0 degree). The skin temperature of the metal roll 4 was set up so that it might become 260 degrees C. The skin temperature of the rubber covered roll 3 in contact with the metal roll 4 was 200 degrees C. The pressures applied to a thermoplastic liquid crystal polymer film and copper foil between rolls were 120 kg/cm2 in planar pressure conversion, and the linear velocity of the periphery of a metal roll was a part for 3m/. Under the above-mentioned condition, after carrying out temporary junction of the thermoplastic liquid crystal polymer film 1 according to copper foil 2, both were introduced and stuck by pressure between the metal roll 4 and the rubber covered roll 3, and the one side metal tension laminate 5 was obtained. Many a wrinkling, stripes, deformation, and unarrived parts were observed by the obtained one side metal tension laminate. Other evaluation results are shown in Table 6.

[0042]

[Table 6]

	加熱ロール温度(℃)	面圧 Kg/cm²	線速度 (m/分)	フィルム接触角度(°)	ゴムロール温度(℃)	外観
実施例1	260	120	3	90	200	○
実施例2	260	120	3	90	200	○
実施例3	275	120	5	90	200	○
実施例4	275	120	5	90	200	○
比較例1	260	120	3	0	200	×

[0043]

[Effect of the Invention] By this invention, there is no wrinkling generating by the thermal expansion of a metal sheet in the heating sticking-by-pressure section, an appearance is good, it has sufficient adhesive strength and an one side metal tension laminate with good dimensional stability is manufactured continuously. Moreover, the good one side metal tension laminate of the above-mentioned quality is offered by this invention.

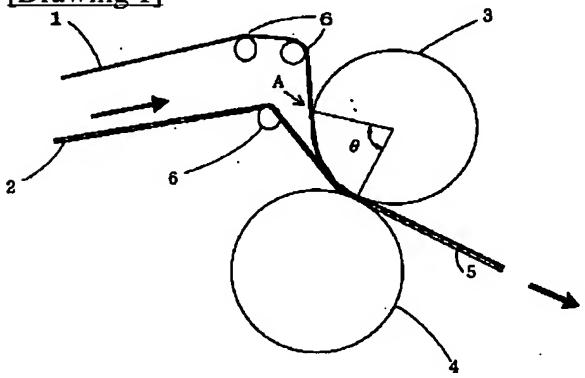
[Translation done.]

* NOTICES *

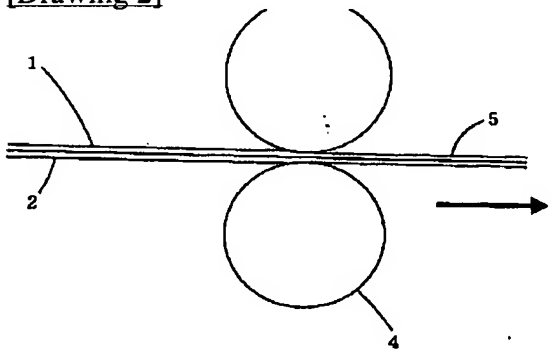
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]